

Savaş Karyağar<sup>1</sup>, Sevda S Karyağar<sup>1</sup>, Celal Tekinbaş<sup>2</sup>, M.Muharrem Erol<sup>2</sup>, Esat Yamaç<sup>2</sup>

<sup>1</sup>Department of Nuclear Medicine, Trabzon Numune Training and Research Hospital, Trabzon,

<sup>2</sup>Department of Thoracic Surgery, Karadeniz Technical University Faculty of Medicine, Trabzon, Turkey

### To the editor

Bone marrow accumulation of 18F-FDG is generally faint diffuse low-grade activity, less than liver activity and mostly seen in vertebral bodies. Metastases can be distinguished by the higher intensity of diffuse FDG uptake. Granulocyte colony stimulation factor treatment and chemotherapy can lead to a diffusely increased FDG uptake [1]. Granulocyte colony stimulating factor (G-CSF)-producing tumors usually show peripheral granulophilia or leukemoid reactions and lead to diffusely increased bone marrow FDG uptake.

A 43-year-old man with pulmonary malignant fibrous histiocytoma was referred to our unit for preoperative staging with PET/CT imaging. After six hours of fasting and having serum glucose 78 mg/dl, the patient was injected with 555 MBq (15 mCi) of F-18 FDG intravenously. After 60 minutes of waiting, the patient was imaged from vertex to middle of the thigh using an integrated PET/CT scanner which consisted of a full-ring high resolution (HI-REZ) PET with lutetium oxy-orthosilicate (LSO) crystal and a 6-slice CT

(Siemens Biograph 6, Chicago, USA). PET/CT image showed intense hypermetabolic mass lesion in the right lung and also showed diffuse FDG uptake throughout the bone marrow suspected for bone marrow metastases (Figure 1 A, B and C1,C2,C3,C4).

Recent chemotherapy treatment, haematologic disorders, granulocyte colony-stimulating factor using was not there on patient medical history. Complete blood count was checked. Total leukocyte count was 51800/μL, with 92.1 % neutrophils, 0.7 % eosinophils, 4.3 %

lymphocytes, and 2.8 % monocytes. Bone marrow biopsy was done and revealed a hypercellular marrow with no evidence of malignancy. It was diagnosed that diffuse bone marrow FDG uptake in our patient was due to leukemoid reaction.

Leukocytosis in excess of 50000/mL not related to bone marrow involvement, termed leukemoid reaction. It is usually seen in response to infection, inflammation, or therapeutic agents such as growth factors and is less commonly caused by malignancy. Reports of granulocyte colony stimulating factor (G-CSF)-producing tumors usually show peripheral granulophilia or leukemoid reactions, suggesting that tumor-derived G-CSF acts on bone-marrow cell proliferation and differentiation to granulocytes.

Different histological types of G-CSF-producing lung cancers such as large cell carcinoma, squamous cell carcinoma, small cell carcinoma, adenocarcinoma, sarcoma and were reported [2]. In literature, four cases of G-CSF-producing tumors originating from the lung were reported, three of which were pleomorphic carcinoma

and the other was a spindle cell carcinoma [3-4]

Our case is the first case of pulmonary malignant fibrous histiocytoma lead to diffuse FDG uptake in the bone marrow on PET-CT due to leukemoid reaction. Nuclear physician should be aware of to leukemoid reaction in whom diffuse increased FDG uptake in the bone marrow was seen.

### References

1. Rosenbaum SJ, Lind T, Antoch G, Bockisch A. False-Positive FDG PET Uptake-the role of PET/CT. *Eur Radiol.* 2006; 16: 1054-65
2. Yoshihara K, Fukuyama K, Okamura T, Watanabe S, Sumida I, Hanada M. An autopsy case of CSF (colony stimulating factor)-producing lung cancer and a review of the literature. *Gan No Rinsho.* 1986; 32: 805-9.
3. Takahashi S, Kuwabara K, Sawafuji M, Akiduki S, Ishizaka A. F-18 FDG PET Imaging in a Patient With Granulocyte Colony Stimulating Factor Producing Pulmonary Pleomorphic Carcinoma. *Clin Nucl Med.* 2008; 33: 555-7.
4. Hidaka D, Koshizuka H, Hiyama J, Nakatsubo S, Ikeda K, Hayashi A. A case of lung cancer producing granulocyte colony-stimulating factor with a significantly high uptake in the bones observed by a FDG-PET scan. *Nihon Kokyuki Gakkai Zasshi.* 2009; 47: 259-63.

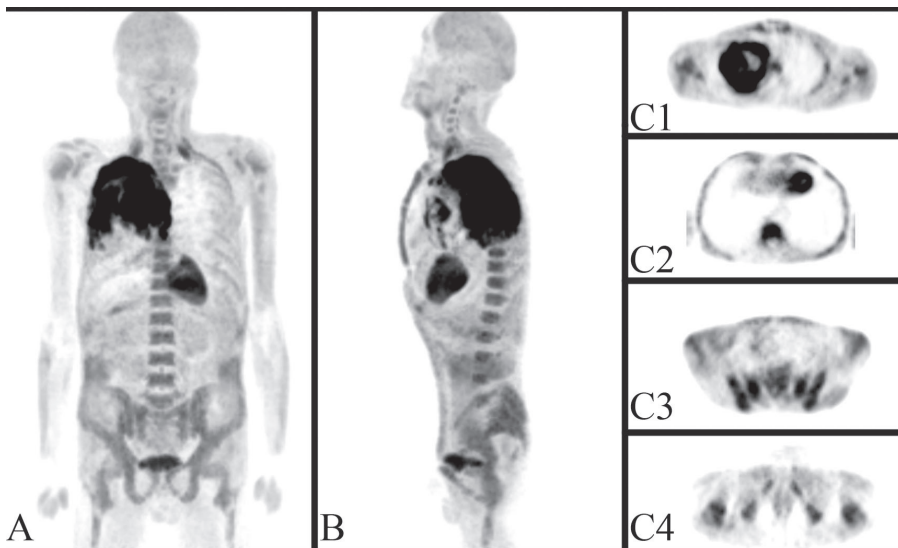


Figure 1. Coronal (A), sagittal (B) whole body PET images and axial PET images at the level of proximal humerus, 12th thoracic vertebra, sacrum and proximal femur (C1, C2, C3, C4 sequentially). PET images showed intense hypermetabolic mass lesion in the right lung (SUVmax: 13.87) and also showed diffuse FDG uptake throughout the bone marrow (SUVmax: 4.39).